Patent
Attorney's Docket No. 024444-580

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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| In re Patent Application of | |
| Mats WALDENSTRÖM et al. | Group Art Unit: 1775 |
| Application No.: 09/214,923 | Examiner: A. Turner |
| Filed: April 20, 1999 | |
| For: CEMENTED CARBIDE INSERT FOR TURNING, MILLING AND DRILLING | |



**RESPONSE**

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

This Response is offered in response to the Official Action of May 23, 2000.

Claims 1 and 2 define a particulary useful cemented carbide insert which is provided with a thin, wear resistant coating. This insert has excellent properties when used in the machining of steels and stainless steels. As discussed in the present specification, various alloy in combinations are known for making inserts suitable for metal cutting. Different types of metal cutting require different properties and often cause different problems. It is further disclosed that changing certain aspects of a composition to improve the cutting performance with respect to a specific work type, that action may have a negative affect on other wear properties. For example, lowering the binder phase content to reduce the formation of thermal fatigue cracks will lower the toughness properties of the insert, which is not desirable. Also, improved abrasive wear can be obtained by increasing

the coating thickness, however, this increases the risk for flaking and lowers the resistance to adhesive wear.

In the insert of the present invention, it has been found that if powder mixtures of hard constituents with both a narrow grain size distribution and narrow average grain size with a tungsten content in the binder present defined in a particular manner, that the resulting inserts have excellent cutting performance in cutting steels and stainless steels in turning, milling and drilling operations under both dry and wet conditions.

For example, in Example 1, inserts made of the same shape, coating and composition with the carbon content adjusted to provide the same CW ratio, the same average grain size and with the only difference being the grain size distribution, inserts made according to the present invention were superior in cutting tests. Similar results are shown throughout the Examples. It is respectfully submitted that the insert of the present invention is not disclosed or suggested by the prior art.

In regard to the various references cited in paragraph 2 of the Official Action in which claim 1 was rejected under 35 U.S.C. § 102(b), it is first noted that anticipation requires that each and every element of the claimed invention be present in the reference either expressly or inherently. In regard to inherency, it is further noted that inherency is something that must be present in all instances, not something which may happen. With that in mind, it is respectfully submitted that none of these references anticipate claim 1. Haglund '247, for example, is not seen to mention at all the grain size of the tungsten carbide. In addition, no specific carbon content is disclosed. Timm et al. '512, is concerned with a special process applied usually after conventional liquid phase sintering.

While it is mentioned that the mean grain size is beneficially less than about 2.5 microns, the desired and exemplified gain size is less than 1 micron. No grain size distribution is mentioned. Shimada '676 discloses a cemented carbide with low impurity levels of trace elements. The average grain size is 0.2-1.5 micron, different from the range herein. The size distribution and carbon content are not disclosed. Iler et al. '050, disclose a cemented carbide with binder phase areas having high tungsten content interspersed with binder phase areas having a low tungsten content. In column 16, it is noted that in preferred bodies of the invention, over half of the grains of tungsten carbide are less than 0.75 microns in diameter and the preferred grain size is submicron. Hitachi JP '745 discloses that the preferred average grain size of WC is less than 0.8 microns. Hitachi JP '049 relates to a cermet with a WC grain size less than 1.5 microns and a gamma phase of less than 2 microns grain size. Toshiba JP '183 also relates to submicron cemented carbides in which the hard phase has "up to 1 micron mean grain size". Kobe Steel JP '185 has an average grain size of 2-8 microns and a small grain size distribution with a standard deviation of up to "0.05 dwc3".

As noted, it is not simply the grain size which is important (although it is submitted that none of the references teach the specific grain size used herein, but at most disclose a possible overlap at one end or the other of the range) but also the size distribution and the amount of tungsten and carbon in the binder phase. Contrary to the Examiner's suggestion, it is submitted that none of these aspects are in themselves inherent, but rather are the subject of manipulation. For example, in the formation of the insert of the present invention, both fine grained and coarse grained materials are eliminated and the cemented

carbide is made under conditions that the narrow distribution is preserved, e.g., milling of the powders before pressing as conventionally used, is eliminated. Similarly, the carbon and tungsten contents are the subject of manipulation as shown, for example, in the Examples in the present case in which the CW ratio of the comparative samples are adjusted to be essentially equal to that of the claimed invention so as to provide comparative tests based on grain size distribution. Since they can be adjusted, it should be clear that they are not "inherently" that which they are made to be. For these and other reasons apparent from reading of the references, it is respectfully requested that the rejection be withdrawn.

Claims 1 and 2 stand rejected under 35 U.S.C. § 102(b) as being anticipated by NGK JP '808. This reference discloses a coated cemented carbide in which 90% of the WC grains are in the range of 0.5-1.5 microns. Again, there is at best an overlap of the grain size without a specific teaching of the grain size distribution or the carbon and tungsten content. The latter deficiencies are not "inherent" and this rejection is therefore inapposite and should be withdrawn.

Similarly, McCandlish et al. '045, which has been cited in paragraph 4 under 35 U.S.C. § 102(e) as anticipating claim 1, relates to nano-sized cemented carbides (column 6, lines 65-67) and the various elements of claim 1 are not disclosed nor inherent in this reference. Withdrawal of this rejected is also requested.

Claim 2 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Haglund et al, or Timm et al., or Shimada et al., or Iler et al., or Hitachi or Toshiba or

Kobe Steel or McCandlish et al. as set forth paragraphs 2 and 4, further in view of Ljungberg et al. '625.

This rejection is also traversed. As noted above, the primary references do not disclose or suggest the presently claimed invention. While Ljungberg '625 discloses the specific coating combination as set forth in claim 2, that claim is not made unpatentable since the primary references are devoid of the teachings of claim 1 and the secondary reference does not otherwise provide those missing elements. Withdrawal of this ground of rejection is also requested.

Withdrawal of the grounds of rejection and early allowance of claims 1 and 2 is earnestly solicited.

Respectfully submitted,

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